Table 4.4-2
Ambient Air Quality Standards

Air Pollutant	Concentration and Averaging Time		Most Relevant Effects
	State Standard	**Federal Primary Standard**	
Ozone (O_3)	0.09 ppm[1], 1-hr. average 0.07 ppm, 8-hr. average	0.075 ppm, 8-hr. average	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals, (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage.
Carbon Monoxide (CO)	20 ppm, 1-hr. average 9.0 ppm, 8-hr. average	35 ppm, 1-hr. average 9.0 ppm, 8-hr. average	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses.
Nitrogen Dioxide (NO_2)	0.18 ppm, 1-hr average 0.03 ppm, annual average	0.053 ppm, annual average	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration.
Sulfur Dioxide (SO_2)	0.25 ppm, 1-hr. average 0.04 ppm, 24-hr average	0.14 ppm, 24-hr average 0.03 ppm, annual average	(a) Bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma.
Suspended Particulate Matter (PM_{10})	50 µg/m$_3$ [2], 24-hr average 20 µg/m^3, annual arithmetic mean	150 µg/m^3, 24-hr average	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Excess seasonal declines in pulmonary function, especially in children.
Suspended Particulate Matter ($PM_{2.5}$)	12 µg/m^3, annual arithmetic mean	35 µg/m^3, 24-hr average 15 µg/m^3, annual arithmetic mean	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Excess seasonal declines in pulmonary function, especially in children.

Air Pollutant	**Concentration and Averaging Time**		**Most Relevant Effects**
	State Standard	**Federal Primary Standard**	
Sulfates	25 $\mu g/m^3$, 24-hr average	Not applicable	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardiopulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage.
Lead	1.5 $\mu g/m^3$, 30-day average	1.5 $\mu g/m^3$, calendar quarter	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction.
Visibility-Reducing Particles	In sufficient amount to reduce the visual range to less than 10 miles at relative humidity less than 70%, 8-hour average (10am - 6pm)	Not applicable	Visibility impairment on days when relative humidity is less than 70 percent.
Hydrogen Sulfide	0.03 ppm, 1-hr. average >	No Federal Standard	Odor annoyance.
Vinyl Chloride	0.01 ppm, 24-hr average >	No Federal Standard	Known carcinogen.

[1] ppm = parts per million by volume
[2] $\mu g/m^3$ = micrograms per cubic meter of air
Note: By convention, metric units are most commonly used to describe pollutant concentrations in the air.
Source: SCAQMD 2009

The Marine Terminal is located near the SCAQMD Southwest Coastal Los Angeles County monitoring station. Recent background air quality data for criteria pollutants for this monitoring station, located approximately 4 miles (6.4 km) northeast of the Marine Terminal in Hawthorne, are presented in Table 4.4-3. Ambient air quality was compared to the most stringent of either the CAAQS or NAAQS. These monitored data indicate that the Southwest Coastal Los Angeles County area is in compliance with the CO, NO_2, SO_2, sulfates and lead standards for both the CAAQS and NAAQS, and the CAAQS sulfate standard.

State O_3, PM_{10}, and $PM_{2.5}$ air quality standards were exceeded at the Southwest Coastal Los Angeles County air monitoring station on some days during 2004 through 2007 (see Table 4.4-3). The eight-hour ozone standard was exceeded on one day in 2007. The PM_{10} standard and the $PM_{2.5}$ standard were exceeded in 2007.

Table 4.4-3
Background Air Quality Data for the Southwest Coastal Los Angeles County Monitoring Station (Area 3)
2004-2007

Constituent	Maximum Observed Concentration (Number of Standard Exceedances - most restrictive)					
	State Standard	**Federal Standard**	**2004**	**2005**	**2006**	**2007**
Carbon monoxide						
1-hour	20.0 ppm	35.0 ppm	6 (0 days)	3 (0 days)	3 (0 days)	3 (0 days)
8-hour	9.0 ppm	9.5 ppm	4.4 (0 days)	2.1 (0 days)	2.3 (0 days)	2.4 (0 days)
Ozone						
1-hour	0.09 ppm	--	0.12 (4 days)[a]	0.086 (0 days)	0.08 (0 days)[a]	0.087 (0 days)
8-hour	0.07 ppm	0.075 ppm	0.10 (13 days)[a]	0.076 (0 days)	0.066 (0 days)[a]	0.074 (1 days)
Nitrogen dioxide						
1-hour	0.18 ppm	--	0.09 (0 days)[a]	0.09 (0 days)	0.1 (0 days)[a]	0.08 (0 days)
Annual	0.03 ppm	0.053 ppm	0.0310[a]	0.0134	0.05[a]	0.014
Sulfur dioxide						
1-hour	0.25 ppm	--	0.03 (0 days)[a]	0.04 (0 days)	0.02 (0 days)[a]	0.02 (0 days)
24-hour	0.04 ppm	0.14 ppm	0.007 (0 days)[a]	0.012 (0 days)	0.006 (0 days)[a]	0.009 (0 days)
Annual	---	0.03 ppm	---	---	---	0.0028
PM_{10}						
24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	52 (2 days)[a]	44 (0 days)	45 (0 days)[a]	96 (2 days)
Annual	20 $\mu g/m^3$	--	30.9a	22.9	26.5a	27.7
$PM_{2.5}$						
24-hour	---	35 $\mu g/m^3$	66.6[b]	53.9[b]	53.6[b]	68.0[b]
Annual	12.0 $\mu g/m^3$	15.0 $\mu g/m^3$	17.6[b]	16.0[b]	14.5[b]	13.7[b]
Lead						
30-day	1.5 $\mu g/m^3$	--	0.01 (0 months)	---	0.01 (0 months)	0.02 (0 months)
Calendar Quarter	---	1.5 $\mu g/m^3$	0.01 (0 qtrs)	---	0.01 (0 qtrs)	0.01 (0 qtrs)
Sulfates						
24-hour	25 $\mu g/m^3$	---	14.3 (0 days)	---	13.6 (0 days)	10.5 (0 days)

a Less than 12 full months of data.
b PM2.5 is not measured in the Southwest Coastal Los Angeles County Monitoring Station. Data are from the South Coastal Los Angeles County Monitoring Station

Notes: ppm = parts per million, µg/m3 = microgram per cubic meter, qtrs = quarters

Source: SCAQMD 2009

Toxic Air Contaminants

The California Health and Safety Code (§39655) defines a toxic air contaminant (TAC) as an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health. Under California's TAC program (Assembly Bill 1807, Health and Safety Code Section 39650 et seq.), the CARB, with the participation of the local air pollution control districts, evaluates and develops any necessary control measures for air toxins. The general goal of regulatory agencies is to limit exposure to TAC to the maximum extent feasible.

<u>Cancer Risk</u>

One of the primary health risks from exposure to TAC is contracting cancer. Cancer is the leading cause of death for Americans between the ages of 45-64 years (NCHS 2007) and accounts for one in every four deaths. The carcinogenic potential of TAC is a particular public health concern because many scientists currently believe that there is no “safe” level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer. Environmental factors (e.g., smoking tobacco, nutrition) account for approximately 75 to 85 percent of cancer cases and deaths in the United States (American Cancer Society 2006). Exposure to pollutants in occupational, community, and other settings is thought to account for a relatively small percentage of cancer deaths, about four percent from occupational exposures and two percent from environmental pollutants (man-made and naturally occurring) (American Cancer Society 2006).

Cancer risks are expressed as the number of additional cancer cases that could develop based on the exposure level per million persons exposed.

<u>Non-Cancer Health Risks</u>

Unlike carcinogens, scientists believe that there is a threshold level of exposure to most non-carcinogens below which the compound will not pose a health risk. The California EPA and Office of Environmental Health Hazard Assessment (OEHHA) have developed reference exposure levels (REL) for TAC that are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The non-cancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison, called the hazard index, is expressed as the ratio of the estimated exposure level to the REL.

<u>Multiple Air Toxics Exposure Study III</u>

In 1998, the State of CARB identified particulate matter from diesel-fueled engines as a toxic air contaminant. Subsequent to this determination, the South Coast Air Quality Management District (SCAQMD) initiated an urban toxic air pollution study, called MATES (for Multiple Air Toxics Exposure Study). The MATES III program is a monitoring and evaluation study conducted in the SCAB by the SCAQMD (2008). The MATES III Study consists of several elements. These include a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the SCAB. The study focused on the carcinogenic risk from exposure to air toxics.

The carcinogenic risk from air toxics in the SCAB, based on the average concentrations at the MATES fixed monitoring sites and the mobile monitoring sites, is about 853 excess cancer cases per million. This risk refers to the expected number of additional cancers in a population of one million individuals that is exposed over a 70 year lifetime. For comparison purposes, the SCAQMD considers the risk of a project to be significant if the carcinogenic risk exceeds 10 excess cancer cases per million.

Thus, the baseline carcinogenic risk resulting from routine exposure to air toxics in the South Coast Air Basin is substantial. Diesel particulate matter (DPM) accounted for more than 70 percent of the cancer risk.

MATES III study identified the risks in the vicinity of the Marine Terminal site due to nearby roadways, freeways and fixed facilities (including the existing Refinery operations). These risks were estimated at 841 cancer cases per million (SCAQMD 2009).

Site-Specific Characteristics

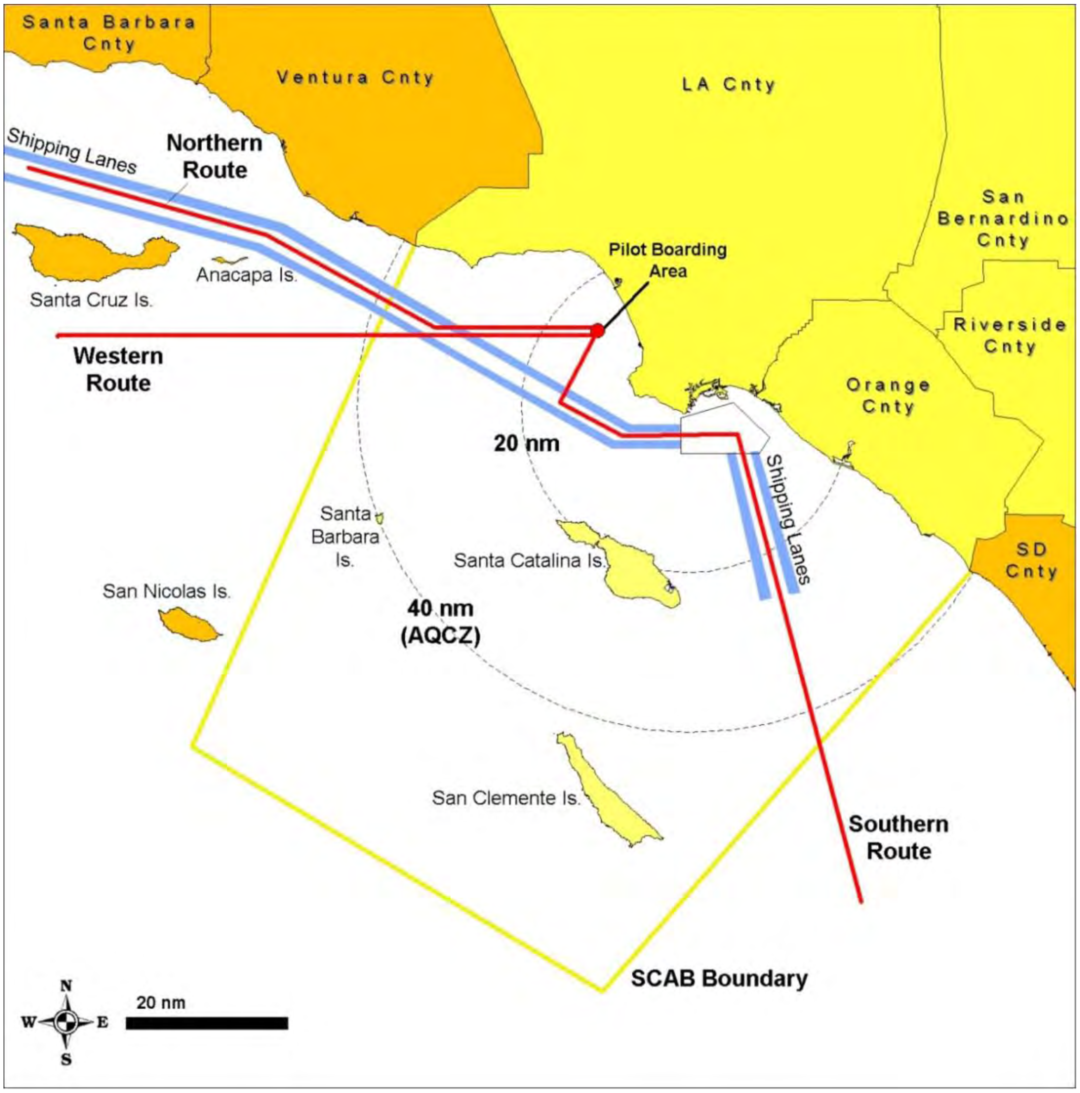
Presently, the Marine Terminal receives crude oil and various partially refined products and exports various Refinery petroleum products. The Project's current emissions generated from these operations are divided into three major categories: (1) vessel-related emissions, (2) stationary source emissions, and (3) mobile source emissions. The estimated air contaminant emissions from these sources are described below.

Vessel-Related Emissions

Vessel emissions result from several vessel-related activities including transit and maneuvering of tankers within California coastal waters, tug assistance to and from the berths, hoteling and combustion emissions that occur during unloading, and emissions from loading products into empty vessels, which displace product volatile organic compound (VOC) vapors to the atmosphere.

The times spent by the tankers while in transit to and from the Marine Terminal were calculated from vessel speeds and transit distances. Vessels in transit to the Marine Terminal from southerly approaches release the maximum emissions, since approaches from the north and west spend less time inside the basin. The United States Coast Guard (USCG) prescribed approach routes for tankers travelling to the Marine Terminal are shown in Figure 4.4-4. For the purpose of this analysis, the southerly marine tanker

Figure 4.4-4
Crude Oil Tanker Routes To and From the Marine Terminal



Source: SCAB Boundary based on POLA 2008a

trips were assumed to originate from sources south of California, such as Mexico and South America, and to enter California coastal waters offshore from the California-Mexico border. Northerly trips were assumed to originate from the Middle East taking the great circle route. Westerly trips were assumed to originate from Alaska and take a route outside of the Channel Islands. Tankers enter the California coastal waters at cruise speed (typically 13 to 14 knots [24.1 to 25.9 kilometers per hour {km/h}). They maintain cruise speed until they enter the Air Quality Compliance Zone (AQCZ) that extends in an arc 40 nautical miles (nm) (74.1 km) from Point Fermin; they then slow to 12 knots (22.2 km/h). They maintain 12 knots (22.2 km/h) speed until they reach the

Pilot Boarding Area, approximately 3 nm (5.6 km) from the Marine Terminal. They then maneuver at a speed of 3 knots (5.6 km/h) or less, usually with tug boat assistance, from the Pilot Boarding Area to a berth at the Marine Terminal. Vessels reverse this routing when leaving the Terminal.

Since actual terminal operations vary on a day-to-day basis, a worst-case emissions scenario was developed for analysis and comparison to the SCAQMD emissions thresholds. This scenario includes worst-case conditions for both the loading and unloading of products carried by ship to and from the Marine Terminal. This gives the worst practicable case for any simultaneous periods of vessel-related activity. Table 4.4-4 shows this worst-case emissions scenario. Since the scenarios at each berth can take more than 24 hours, multiple scenarios were examined, including one which involved transit and hoteling and unloading and one that addressed mostly hoteling and unloading. Table 4.4-5 shows the resultant emissions and Appendix E provides the emission calculations. Assumptions included in the calculation of maximum daily air pollutant emissions include:

- The high Reid Vapor Pressure (RVP) (a standard measurement of a liquid's vapor pressure) product loaded at Berth 3 is diesel;
- The low RVP product unloaded at Berth 4 is crude oil;
- One tanker is at Berth 3 and one tanker is at Berth 4 simultaneously during unloading and loading;
- Each tanker uses residual fuel in all engines with a worst-case fuel sulfur content of 2.5 percent, which is the level determined by the CARB surveys of vessel operators (CARB 2005a);
- The Berth 4 tanker displaces 150,000 (dead weight tons) DWT with a cargo capacity of 1.1 million barrels (bbl) of crude oil;
- The Berth 3 tanker displaces 35,000 DWT with a cargo capacity of 264,000 bbl of diesel fuel;
- Two tugs assist each tanker to berth and two provide assistance upon departure; and
- Time estimates described in the scenarios have been rounded to the nearest whole hour.

As shown in Table 4.4-5, for all pollutants except VOC, the majority of the emissions are generated by the ship’s main engine and are released along the tanker transit route. The remaining non-VOC emissions are produced by the auxiliary engine, boiler combustion during hoteling and product transfer, and tug boats.

The dominant source for VOC emissions is vapor loss from product transfer during hoteling. These emissions are due to vapor displacement where low RVP material (crude oil) destined for the terminal is unloaded, and high RVP product (diesel) is loaded from the terminal for shipment. The Marine Terminal currently complies with SCAQMD Rule 1142 by using permitted auxiliary barges fitted with their own vapor recovery equipment (carbon canisters) to capture displaced vapors. SCAQMD Rule 1142 requires that VOC emissions from loading and unloading activities be limited to no more than two pounds (lbs) (0.9 kilograms [kg]) per 1,000 bbl transferred. This emission rate was used to estimate the emissions from loading and unloading operations at the project site.

Table 4.4-4
Current Ship Activity Worst-Case Emission Scenarios

Vessel Unloading Scenario at Berth 4	
Duration	**Activity**
<1 hour	One 150,000 DWT tanker enters the SCAB from the south and transits approximately 5 nm (9.3 km) at full cruise speed to the AQCZ (40 nm [74.1 km] line).
5 hours	The tanker slows to 12 knots (22.2 km/h) and transits approximately 64 nm (118.5 km) within the AQCZ to the pilot boarding area.
1 hour	The tanker maneuvers the final 3 nm (5.56 km) from the pilot boarding area to the berth. Two tugs assist tanker to mooring and vessel makes fast.
1 hours	Hotel vessel, undergo safety and other inspections.
22 hour	Hotel vessel. Unload 1.1 million bbl of low RVP product (crude) at 50,000 barrels per hour (bph) from vessel.
1 hour	Hotel vessel. Disconnect loading lines, cast off, depart to 3 nm (5.6 km) offshore. Two tugs assist tanker from berth.
Vessel Unloading Scenario at Berth 3	
Duration	**Activity**
<1 hour	One 35,000 DWT tanker enters the SCAB from the south and transits approximately 5 nm (9.3 km) at full cruise speed to the AQCZ (40 nm [74.1 km] line).
5 hours	The tanker slows to 12 knots (22.2 km/h) and transits approximately 64 nm (118.5 km) within the AQCZ to the pilot boarding area.
1 hour	The tanker maneuvers the final 3 nm (5.6 km) from the pilot boarding area to the berth. Two tugs assist tanker to mooring and vessel makes fast.
1 hour	Hotel vessel, undergo safety and other inspections.
22 hours	Hotel vessel. Load 264,000 bbl of high RVP product (diesel) at 12,000 bph to vessel.
1 hour	Hotel vessel. Disconnect loading lines, cast off, depart to 3 nm (5.6 km) offshore. Two tugs assist tanker from berth.

Notes: Daily (24-hour) emissions for each criteria pollutant were estimated for two different hypothetical 24-hour periods within the scenarios described above: (a) 6.6 hours of tanker transit (i.e., maneuvering) and 17.4 hours of hoteling, including the first 16.4 hours of product transfer; and (b) one hour of transit (i.e., maneuvering) plus 23 hours of hoteling, including 22 hours of product transfer. The highest emission rate of the two calculations was used as the worst-case daily emission rate for each pollutant.

Table 4.4-5
Criteria Air Emissions Peak Day
Current Operations

Source	CO (lbs/day)	VOC (lbs/day)	NO_x (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)
Marine Vessel Activities						
Tanker Transit and Maneuvering	176	2	2,235	1,403	192	177
Hoteling/Product Transfer Engine Combustion	88	27	746	929	76	70
Product Transfer Vapor Emissions	0	2,728	0	0	0	0
Tug Boat Assistance	71	2	13	3	10	9
Total Marine Vessel Emissions	**335**	**2,759**	**2,994**	**2,335**	**278**	**256**
Stationary Sources						
Tank Emissions	0	249	0	0	0	0
Mobile Sources						
Employee Vehicle Trips	6.3	0.7	0.7	0.004	0.5	0.1
Total Emissions	**341**	**3,008**	**2,994**	**2,335**	**278**	**256**

Notes: Since the transit and hoteling often takes longer than 24 hours, multiple scenarios were examined. Maximum daily VOC emissions would occur when ships maneuver for one hour and hotel for 23 hours, during which they transfer product for 22 hours. Maximum daily emissions of all other pollutants would occur during the period when ships transit and then hotel for the remaining 24 hour period.

Stationary Source Emissions

Currently 64 storage tanks at the Refinery site temporarily store petroleum products before they are discharged to or transferred from the Marine Terminal. Tank capacities range from 28,000 to 600,000 bbl. Crude oil and products unloaded at the Marine Terminal are stored in a number of different tanks depending on the availability. Crude oil tanks at the Refinery are floating roof-type tanks. Products loaded at the Marine Terminal are stored in a number of different tanks at the Refinery depending on the product type. Product tanks at the Refinery are floating roof-type with fixed roof and vapor recovery.

The storage tanks emit VOC from tank working and breathing. All of the tanks together generate on average 249 pounds per day (lb/day) (112.9 kg/day) of VOC emissions based on reporting requirements to the SCAQMD (Chevron 2007).

Mobile Source Emissions

The Marine Terminal has a minimum of three employees on duty during loading, discharging, and tank-washing operations. These employee's vehicles are assumed to be single-occupant vehicles traveling 50 miles (80.5 km) daily to and from the site. Table 4.4-5 shows the estimated vehicle emissions and Appendix E provides the mobile source emission calculations.

Toxic Emissions

Toxic emissions from the Marine Terminal are grouped into two areas: toxic emissions from fuel combustion associated with the vessels and toxic emissions from vapor emitted during product loading activities.

Toxic Emissions and Impacts due to Vessel Fuel Combustion

Toxic impacts due to fuel combustion principally produce cancer impacts due to particulate matter emissions. The incremental lifetime cancer risk associated with tanker visits to the Marine Terminal was estimated based on a health risk assessment of marine vessel emissions conducted for the Chevron Heavy Crude Project Final EIR (SCAQMD 2006) and by Industrial Source Complex (ISC) modeling performed as part of this EIR (see Appendix E). The Heavy Crude EIR estimated the cancer risk to onshore residential receptors associated with 15 additional crude oil marine tankers per year at the Marine Terminal.

Marine tankers emit particulate matter while in transit to and from the Marine Terminal and while moored at the terminal. The distance traveled by the marine tankers within the SCAB while in transit to the Terminal is more than 60 nm (111.1 km). According to the Chevron Heavy Crude EIR, the DPM emissions from the tankers while in transit would be dispersed over an extensive area and were not included in the health risk assessment. The tankers would be at a fixed location while moored at the Marine Terminal and the health risk assessment in the Heavy Crude EIR (SCAQMD 2006) evaluated potential impacts from DPM emissions during maneuvering and hoteling at the Terminal.

Modeling of emissions from the marine tankers in the Heavy Crude EIR used the Offshore and Coastal Dispersion Model (OCD), version 5, which is designed to account for the potential differences between over-water and over-land dispersion characteristics. The OCD model was run with one year of meteorological data from

1996. Receptors for the modeling were located from the shoreline to approximately 3 miles (4.8 km) inland.

The results of the Chevron Heavy Crude Project EIR modeling indicated that the increase in cancer risk associated with particulate matter from the additional marine tankers associated with the heavy crude project would cause an increase of 1.6 cancer cases per million for the 15 additional tankers assessed in the Chevron Heavy Crude Project EIR. Extrapolating this to the current vessel traffic at the Marine Terminal equates to an existing baseline maximum individual cancer risk onshore of 36.8 cancer cases per million associated with the Marine Terminal current baseline operations.

In order to check the Chevron calculations, ISC modeling runs were performed to assess the potential impact of maneuvering and hoteling DPM emissions on onshore receptors. Meteorological information from the Hawthorn Station (the Lennox meteorological files) were used. Utilizing the unit risk factors for diesel of 3×10^{-4} (as per the OEHHA recommendations) resulted in a peak cancer risk onshore of 35.4 cases per million, which is in good agreement with the Chevron calculations. Additional information on the ISC modeling and the risk contours are included in the Appendix E.

Toxic Emissions and Impacts Due to Vessel Loading

Emissions of VOC occur during vessel loading operations due to the movement of product into the vessel tank spaces and the displacement of product vapors out of the vessel tank spaces. The Marine Terminal utilizes vapor recovery barges equipped with carbon canisters to reduce the VOC emissions to levels less than the SCAQMD permit limit of two pounds (0.9 kg) VOC per 1,000 bbl loaded. The health risks would be a function of the types of materials being loaded onto the product vessels. The products loaded at the Marine Terminal historically have been fuel oil, diesel fuel and vacuum gas oil (year 2008). According to CARB speciation profiles for distillate vapors, the only component in distillate vapors that is considered a toxic component under AB2588 is n-hexane. N-hexane only presents a health risk through chronic toxicity and does not present a health risk for cancer or acute toxicity (CARB 2005b). The annual emissions of n-hexane vapors from loadings at the Marine Terminal based on the total annual barrels of product loaded (7.3 million bbl in 2008) and the CARB speciation profiles for distillate vapors, is 1,314 pounds/year (596.0 kg/year). Modeling conducted utilizing both ISC and the OCD, indicate that the onshore chronic toxicity of n-hexane from vapor emissions would produce less than a 0.001 health hazard index for chronic exposure. See the Appendix E for more details.

Greenhouse Gas Emissions

Greenhouse gases (GHG) are defined as any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorocarbons. These GHG trap and build up heat in the atmosphere near the earth's surface, commonly known as the "greenhouse effect." The accumulation of GHG in the atmosphere regulates the earth's temperature. Without natural GHG, the Earth's surface would be cooler. Emissions from human activities, such as electricity production and vehicle operation, have elevated the concentration of these gases in the atmosphere. There is increasing evidence that the greenhouse effect is leading to global warming and climate change (EPA 2000).

Greenhouse gases have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere. Because GHG absorb different amounts of heat, a common reference gas, CO_2, is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "CO_2 equivalent" and is the amount of GHG emitted multiplied by the GWP. The GWP of CO_2 is defined as one, whereas the GWP of methane, for example, is 21, meaning that methane gas absorbs 21 times as much heat as CO_2, and therefore has 21 times greater impact on global warming per pound of emissions as CO_2.

Global climate change considered by many scientists to be caused by GHG emissions is currently one of the most important and widely debated scientific, economic, and political issues in the United States. Global climate change is a change in the average weather of the earth, which can be measured by wind patterns, storms, precipitation, and temperature. Historical records show that temperature has changed in the past, such as during previous ice ages. Some data indicate that the current temperature record differs from previous climate changes in rate and magnitude (AEP 2007). These climate changes could lead to various changes in weather, rainfall patterns, and increasing sea level leading to flooding.

Water vapor is the most abundant and variable GHG in the atmosphere. It is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves (AEP 2007).

Carbon dioxide is an odorless, colorless greenhouse gas. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Burning fuels, such as coal, oil, natural gas, and wood, is an anthropogenic (caused by humans) source of carbon dioxide. Carbon dioxide concentrations are currently approximately 370 ppm in the atmosphere; some say that concentrations may increase to 540 ppm by 2100 as a direct result of anthropogenic sources (IPCC 2007). Some predict that this will cause an average global temperature rise of at least 2° C (3.6 °F) (IPCC 2007).

Methane is the main component of natural gas used in homes and has a GWP of approximately 21. Natural sources of methane include the decay of organic matter in landfills, fermentation of manure, and cattle. Geological deposits known as natural gas fields contain methane, which is extracted for fuel.

Nitrous oxide is a colorless gas with a GWP of approximately 310. Nitrous oxide is produced by microbial processes in soil and water, including reactions in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (nylon production, nitric acid production) also emit N_2O. Nitrous oxide is also used in rocket engines and race cars and as an aerosol spray propellant. During combustion, NOx (NOx is a generic term for mono-nitrogen oxides NO and NO_2) is produced as a criteria pollutant (see above), and is not the same as nitrous oxide (N_2O). Very small quantities of N_2O may be formed during fuel combustion by the reaction of nitrogen and oxygen (API 2004).

Chlorofluorocarbons (CFC) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine or fluorine atoms. CFC are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere (the level of air at the earth's surface). CFC were first synthesized in 1928 as refrigerants, aerosol propellants, and cleaning solvents. However, they destroy stratospheric ozone and the Montreal Protocol stopped their production. Hydrofluorocarbons are synthetic chemicals that are a substitute for CFC in automobile air conditioners and refrigerants. Perfluorocarbons are used in aluminum production and semiconductor manufacture. Fluorocarbons have a GWP between 140 and 11,700.

Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas - 23,900. Sulfur hexafluoride is used as insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Fossil fuel combustion represents the vast majority of GHG emissions, with CO_2 the primary GHG. Greenhouse gas emissions in the United States were 7,260 million metric tons of CO_2- equivalents in 2005, of which 84 percent was CO_2 emissions (EPA 2007).

California GHG emissions are large in a global context and continue to grow over time. California GHG emissions are the sixteenth-largest in the world. In 2004, California produced 492 million metric tons of CO_2-equivalent GHG emissions (CEC 2006). The transportation sector is the single largest contributor to California GHG emissions, producing 41 percent of total GHG emissions in 2004. Electrical generation produced 22 percent of GHG emissions. Most of California's emissions, 81 percent, are CO_2 from fossil fuel combustion (CEC 2006).

The quantification of GHG emissions associated with a project can be complex. Greenhouse gas emissions are global in that emissions from one location could affect the entire planet and are not limited to local impacts. Therefore a "lifecycle" type of analysis must be conducted to evaluate the GHG emissions associated with the extraction of "raw material" through their "end use" cycle including the proposed Project's direct, indirect, and cumulative impact.

Greenhouse gas emissions are classified as direct and indirect. Direct emissions are associated with any production of GHG emissions at the Project site. These would include the combustion of natural gas in heaters or compressor engines, the combustion of diesel fuel in crane engines or construction vehicles, the combustion of gas to produce electricity onsite and fugitive emissions from valves and connections, which include methane as a component.

Indirect emissions associated with the Project include emissions from vehicles (both gasoline and diesel) delivering materials and equipment to the proposed Project site or the use of electricity from the grid produced offsite. The production of electricity produces GHG emissions and needs to be accounted for as part of the Project.

In order to quantify the emissions associated with electrical generation, the "resource mix" for a particular area must be determined. The resource mix is the proportion of electricity generated from different sources. Electricity generated from coal or oil combustion produces greater GHG emissions than electricity generated from natural gas combustion because coal and oil have a higher carbon content. Electricity generated from wind turbines, hydroelectric dams, or nuclear power is assigned zero GHG emissions. Although these sources have some GHG emissions associated with the manufacture of the wind generators, the mining and enrichment of uranium or the displacement of forest areas for reservoirs, these emissions have not been included in the lifecycle analysis because they are assumed to be relatively small compared to the electricity generated. Estimates of nuclear power GHG emissions associated with uranium mining and enrichment range up to about 60 pounds per megawatt hour (lbs/MWh), or about five percent of natural gas turbine GHG emissions (Canada 1998).

Detailed information on the power generation plants, their contribution to area electricity "resource mix," and their associated emissions have been developed by the EPA in a database called the Emissions & Generation Resource Integrated Database (eGRID). The most recent version of eGRID, released in April 2007, was used in this analysis (EPA 2007). eGRID is a comprehensive inventory of environmental attributes of electric power systems developed from a variety of data collected by the EPA, Energy Information Administration, and Federal Energy Regulatory Commission.

eGRID includes electricity generated from coal, gas, oil, biomass (e.g., wood, paper, agricultural byproducts, landfill gas, digester gas), nuclear, hydroelectric, geothermal, solar, wind, and other fossil fuels (e.g., solid waste, tire derived fuel, hydrogen, methanol, coke gas). Each of these is assigned criteria as well as GHG emission levels based on plant specifics. Nuclear, hydroelectric, wind, geothermal, biomass, and solar are assigned zero GHG emissions. The eGRID assigns zero CO_2 emissions to generation from the combustion of all biomass because these organic materials would otherwise release CO_2 (or other GHG) to the atmosphere through natural decomposition. The other fuels are assigned GHG emissions levels based on the fuel carbon content.

An analysis of the database was conducted for this report to assign a GHG emissions level to electricity generated for the current and proposed Project operations. The resource mix and estimated GHG emissions for a range of areas is shown in Table 4.4-6. Note that about half of the electricity in the United States is generated from coal, producing a GHG emissions level of approximately 1,363 pounds/MWh. The GHG emissions rate is lower in western states (California, Oregon, etc), primarily due to increased use of hydroelectric and natural gas. The California Independent Service Operator (CALISO) area, which includes some generation outside of California, has a low GHG emission rate, approximately 687 pounds/MWh, due to the contribution of hydroelectric, nuclear, and renewable sources. The Southern California Edison (SCE) GHG emission rate is lower than the CALISO average due to the reliance on the San Onofre nuclear power plant. The SCE service area includes partial use of electricity from the San Onofre nuclear power plant, the use of hydroelectric in San Bernardino and the Sierra Nevada and the use of geothermal plants located in Nevada. It was also assumed that the Mojave Coal power station is not in operation.

The GHG emission rate for electricity obtained from CALISO is about 45 percent less than the rate associated with direct natural gas combustion due to the electricity resource mix including non-GHG emission creating resources (hydroelectric, nuclear, renewables). This is based on the analysis of the eGRID database (EPA 2007).

Table 4.4-6
Electricity Generation Resource Mix and GHG Emissions

Area	**United States**	**Western States**	**CALISO**	**SCE Service Area**[1]
Resource Mix[2]**, percent**				
Coal	50.2	34.2	1.2	1.7
Oil	3.0	0.5	1.2	0.9
Gas	17.4	26.3	51.1	41.9
Nuclear	20.0	9.9	16.8	38.0
Hydro	6.6	24.3	17.3	4.7
Biomass	1.4	1.3	3.2	2.9
Wind	0.3	0.9	2.4	3.8
Solar	0.0	0.1	0.3	0.8
Geo	0.3	2.0	5.5	4.1
Other Fossil	0.5	0.3	0.9	1.2
Other	0.1	0.0	0.0	0.0
Non-renewables	91.3	71.3	71.3	83.7
Renewables	8.7	28.7	28.7	16.3
Non-hydro Renewables[3]	2.1	4.3	11.4	11.6
CO_2 Rate, lb/MWh (kg/)	1363	1107	687	613

[1] The Southern California Edison (SCE) service area includes power from 75 percent of San Onofre, Geothermal in Nevada and hydro in Sierra Nevada, San Bernardino & LA.
[2] Resource mix is the percentage of total mega-watt hours.
[3]Non-hydro renewables include geothermal, solar, wind ,and biomass. Non-hydro renewables are a subset of renewables.
Note: The Mojave Coal Fired Power Plant is not included in CALISO or SCE service area.
Source: EPA 2007 with modifications (i.e., Mojave removed)

Greenhouse gas emissions are calculated for both direct and indirect emissions. Table 4.4-7 summarizes GHG emitted by Project facilities. Direct emissions included fuel combustion associated with vessel engines (both main and auxiliary) and tug boats, fugitive emissions from loading and offloading, and Marine Terminal components. Indirect emissions are associated with vehicles (employee commuters) and offsite electrical generation (purchased from the grid) to produce the electricity used by the Marine Terminal to power pumps and equipment. Greenhouse gas emissions rates from electrical generation, due to the wide variability in electricity sources and between seasons and times of day, used the CALISO rate previously discussed.

Greenhouse gas emissions are calculated for emissions that occur within the SCAB, California, and worldwide. Worldwide emissions are associated with the transportation of crude oil and products to and from the Marine Terminal and their point of origin or destination.

Table 4.4-7
Current Greenhouse Gases Emissions Summary

Emission Source	Annual Emissions (tons/year)		
	N_2O	CO_2	CH_4
Within SCAB			
Vessel movements (engines & boilers)	2.1	32,069	0.7
Tug assistance	0.06	5,747	0.8
Marine Terminal fugitive emissions (loading & offloading, components, tanks)	0.0	13.5	27.1
Marine Terminal indirect (electrical and offsite)	0.001	2,376	0.003
Totals	2.1	40,206	28.6
Total, CO_2 equivalent, metric tonnes	37,317		
Within California			
Vessel movements – engines & boilers	3.0	51,426	1.1
Tug assistance	0.06	5,747	0.8
Marine Terminal fugitive emissions (loading & offloading, components, tanks)	0.0	14	27.1
Marine Terminal indirect (electrical & offsite)	0.001	2,376	0.003
Totals	3.1	59,563	29.0
Total, CO_2 equivalent, metric tonnes	55,014		
Outside of SCAB and California - Worldwide			
Vessel movements – engines & boilers	51.5	1,040,109	19.7
Total, CO_2 equivalent, metric tonnes	950,845		

Notes: Electrical generation assumes CALISO weighted average GHG emission rate.
California emissions include emissions within SCAB plus emissions from barges that travel the California Coast.

4.4.2 Regulatory Setting

Federal, state, and local agencies have established standards and regulations that govern the proposed Project. A summary of the regulatory setting for air quality is provided.

Federal

The Clean Air Act of 1970 directs attainment and maintenance of the NAAQS. The 1990 Amendments to this Act included new provisions that address air pollutant emissions that affect local, regional, and global air quality. The EPA is responsible for implementing the Clean Air Act and establishing the NAAQS for criteria pollutants. In 1997, the EPA adopted revisions to the Ozone and Particulate Matter Standards in the Clean Air Act. These revisions included new eight-hour ozone standards and new particulate matter standards for particulates less $PM_{2.5}$. However, in May of 1999 the U.S. Court of Appeals for the District of Columbia remanded the new ozone standards. In January 2001, the EPA issued a Proposed Response to Remand that declared the revised ozone standard should remain at 0.08 ppm. In February of 2001, the US Supreme Court upheld the constitutionality of the Clean Air Act as the EPA interpreted it, setting health-protective air quality standards for ground-level ozone and particulate matter. In April of 2004, the EPA issued its Final Nonattainment Area Designations for Eight-Hour Ozone Standard.

Air Quality Management Plan

Under the provisions of the Clean Air Act, the EPA requires each state that has not attained the NAAQS to prepare an Air Quality Management Plan (AQMP), a separate local plan detailing how these standards are to be met. These plans are to be prepared by local agencies designated by the governor of each state and incorporated into a State Implementation Plan. The California Lewis Air Quality Act of 1976 established the four-county SCAQMD and mandated a planning process requiring preparation of an AQMP. The SCAQMD Governing Board adopted the 2007 AQMP in June of 2008. The 2008 AQMP updates the attainment demonstration for the Federal standards for ozone and PM_{10}; replaces the 1997 attainment demonstration for the Federal CO standard and provides a basis for a maintenance plan for CO for the future; and updates the maintenance plan for the Federal NO_2 standard. Proposed Projects in the Basin are to be evaluated for conformity with the provisions of the 2007 Plan.

IMO MARPOL Annex VI

The International Maritime Organization (IMO) Marine Pollution (MARPOL) Annex VI, which came into force in May 2005, set new international NOx emission limits on Category 3 (>1,831 cubic inches [30 liters] per cylinder displacement) marine engines installed on new vessels retroactive to the year 2000. For oceangoing vessel main propulsion engines (<130 revolutions per minute engine speed), the NOx limits are approximately six percent less than the average emissions from pre-Annex VI ships. In this study, worst-case daily emissions were calculated assuming pre-Annex VI ships because the ship fleet turnover rate is slow and uncertain.

Emission Standards for Non-road Diesel Engines

To reduce emissions from non-road diesel equipment, the EPA established a series of increasingly strict emission standards for new non-road diesel engines. Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category. Tier 2 standards are phased in from 2001 to 2006. Tier 3 standards will be phased in from 2006 to 2008. Tier 4 standards, which likely will require add-on emission control equipment, will be phased in from 2008 to 2015. These standards will apply to construction equipment; marine vessels are exempt.

Emission Standards for Marine Diesel Engines

To reduce emissions from Category 1 (at least 50 horsepower but < 305 cubic inches [five liters] per cylinder displacement) and Category 2 (305 to 1,831 cubic inches [five to 30 liters] per cylinder displacement) marine diesel engines, the EPA established emission standards for new engines, referred to as Tier 2 marine engine standards. The Tier 2 standards will be phased in from 2004 to 2007 (year of manufacture), depending on the engine size (EPA 1999). For the proposed Project, this rule is assumed to affect tug boats but not oceangoing vessel auxiliary engines because the latter would likely be manufactured overseas and, therefore, would not be subject to the rule. In this study, worst case daily emissions were calculated by conservatively assuming tug boats with pre-Tier 2 engines.

State

California Air Resources Board

The CARB established the CAAQS; comparing the criteria pollutant concentrations in ambient air to the CAAQS determines state attainment status for criteria pollutants in a given region. CARB has jurisdiction over all air pollutant sources in the state; it delegated responsibility for stationary sources to local air districts and retained authority over emissions from mobile sources. CARB, in partnership with the local California air quality management districts, has developed a pollutant monitoring network to aid attainment of CAAQS. The network consists of numerous monitoring stations throughout California that monitor and report various pollutants' concentrations in ambient air.

California Clean Air Act

The California Clear Air Act (CCAA) went into effect in January 1, 1989, and was amended in 1992 (California Health and Safety Code, Division 26). The CCAA mandates achieving the health-based CAAQS at the earliest practical date.

Air Toxics "Hot Spots" Information and Assessment Act of 1987

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 requires an inventory of air toxics emissions from individual facilities, an assessment of health risk, and notification of potential significant health risk (California Health & Safety Code, Division 26, Part 6).

California Diesel Fuel Regulations

With the California Diesel Fuel Regulations, the CARB set sulfur limitations for diesel fuel sold in California for use in on-road and off-road motor vehicles (CARB 2004). Harbor craft and intrastate locomotives were originally excluded from the rule, but were later included by a 2004 rule amendment (CARB 2005c). Under this rule, diesel fuel used in motor vehicles except harbor craft and intrastate locomotives has been limited to 500-ppm sulfur since 1993. The sulfur limit was reduced to 15 ppm, effective September 1, 2006. Diesel fuel used in harbor craft in the SCAQMD was also limited to 500-ppm sulfur starting January 1, 2006, and 15-ppm sulfur by September 1, 2006. Diesel fuel used in intrastate locomotives (switch locomotives) were limited to 15-ppm sulfur on January 1, 2007.

Measures to Reduce Emissions from Ship Auxiliary Engines

On December 6, 2006, the Office of Administrative Law approved a CARB regulation aimed at curbing emissions from ship auxiliary engines. The regulation is 13 CCR, Section 2299.1, Emission Limits and Requirements for Auxiliary Diesel Engines and Diesel-Electric Engines Operated on Ocean-going Vessels within California Waters and 24 Nautical Miles of the California Baseline (CARB 2005d). The regulation required that as of January 1, 2007, ship auxiliary engines operating in California waters must use marine diesel oil (MDO) with a maximum of 0.5 percent sulfur by weight or use marine gas oil (MGO). Then, starting on January 1, 2010, auxiliary engines operating in

California waters must use another method (marine gas oil with 0.1 percent sulfur by weight for example). In lieu of these requirements, alternative emission control strategies can be used provided they result in emissions of diesel PM, NOx, and sulfur oxide (SOx) from the auxiliary diesel engines that are no greater than the emissions that would have occurred with the aforementioned fuels. Under certain conditions, the regulation also allows for the payment of fees in lieu of achieving the emission reductions. Examples of such conditions include an inadequate fuel supply, delayed compliance due to the need for physical modifications to the vessel, and vessels that call infrequently.[1] These regulations are currently being challenged in Federal Court (POLA 2008b).

Greenhouse Gasses

Executive Order S-3-05

The 2005 California Executive Order S-3-05 established the following greenhouse gas emission reduction targets for California:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels; and
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

The Secretary of the California Environmental Protection Agency (CalEPA) is charged with coordinating oversight of efforts to meet these targets and formed the Climate Action Team to execute the Order. Emission reduction strategies or programs developed by the Climate Action Team to meet the emission targets are outlined in a March 2006 report (CalEPA 2006). The Climate Action Team also provided strategies and input to the CARB Scoping Plan.

Assembly Bill 1493

In 2002, the legislature passed Assembly Bill (AB) 1493 (the Pavley regulations), which stated that global warming was a matter of increasing concern for public health and the environment in the state. AB 1493 cited several risks that California faces from climate

[1] Because this regulation allows for the payment of fees in lieu of achieving emission reductions in certain circumstances, the percentage of tanker auxiliary engines that would reduce emissions while calling at the Marine Terminal is unknown. Therefore, the effects of this regulation were not accounted for in the unmitigated emission estimates in this study. This approach is conservative for unmitigated project emissions, as this regulation would likely result in cleaner fuels and lower auxiliary engine emissions for many of the tankers calling at the Marine Terminal during the Project lifetime.

change, including reduction in water supply, increased air pollution due to higher temperatures, harm to agriculture, damage to the coastline, increased risk of wildfires,, and economic losses from higher food, water, energy, and insurance prices. Furthermore, the legislature stated that technological solutions for reducing greenhouse gas emissions would stimulate California's economy and provide jobs. Accordingly, AB 1493 required CARB to develop and adopt the nation's first greenhouse gas emission standards for automobiles. CARB responded by adopting CO_2-equivalent fleet average emission standards. The standards will be phased in from 2009 to 2016, reducing emissions by 22 percent in the "near term" (2009 to 2012) and 30 percent in the "mid-term" (2013 to 2016), as compared to 2002 fleets.

The legislature passed amendments to AB 1493 in September 2009. Implementation of AB 1493 requires a waiver from the EPA, which was granted in June 2009.

<u>Assembly Bill 32</u>

AB 32 codifies the State's greenhouse gas emissions target, requires the State to reduce global warming emissions to 1990 levels by 2020, and directs the CARB to enforce the statewide cap that would begin phasing in by 2012. Governor Arnold Schwarzenegger signed AB 32 on September 27, 2006. Key AB 32 milestones include:

- June 20, 2007 – Identify "discrete early action greenhouse gas emission reduction measures."
- January 1, 2008 – Identify the 1990 baseline greenhouse gas emissions levels and approve a statewide limit equivalent to that level. Adopt reporting and verification requirements concerning greenhouse gas emissions.
- January 1, 2009 – Adopt a scoping plan for achieving greenhouse gas emission reductions.
- January 1, 2010 – Adopt and enforce regulations to implement the "discrete" actions.
- January 1, 2011 – Adopt greenhouse gas emission limits and reduction measures by regulation.
- January 1, 2012 – Greenhouse gas emission limits and reduction measures adopted in 2011 become enforceable.

Since the passage of AB 32, CARB published Proposed Early Actions to Mitigate Climate Change in California (CalEPA 2007b). This publication indicated that the issue of greenhouse gas emissions in CEQA and General Plans was being deferred for later action, so the publication did not discuss any early action measures generally related to CEQA or land use decisions.

California Senate Bill 1368

In 2006, the California legislature passed Senate Bill (SB) SB 1368, which requires the Public Utilities Commission (PUC) to develop and adopt a “greenhouse gases emission performance standard” by February 1, 2007, for private electric utilities it regulates. The PUC adopted an interim standard on January 25, 2007, requiring that all new long-term commitments for base load generation to serve California consumers would be with power plants creating emissions no greater than a combined cycle gas turbine plant. That level is established at 1,100 pounds of CO_2 per megawatt hour. The California Energy Commission has also adopted similar rules.

Senate Bill 97 – CEQA: Greenhouse Gas Emissions

In August 2007, Governor Schwarzenegger signed into law SB 97, CEQA: Greenhouse Gas Emissions stating, “This bill advances a coordinated policy for reducing greenhouse gas emissions by directing the Office of Planning and Research and the Resources Agency to develop CEQA guidelines on how state and local agencies should analyze, and when necessary, mitigate greenhouse gas emissions.” Specifically, SB 97 requires the Office of Planning and Research (OPR), by July 1, 2009, to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions, as required by CEQA, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency would be required to certify and adopt those guidelines by January 1, 2010. OPR would be required to periodically update the guidelines to incorporate new information or criteria established by the State Air Resources Board pursuant to the California Global Warming Solutions Act of 2006. SB 97 also identifies a limited list of types of projects that would be exempt under CEQA from analyzing GHG emissions.

On January 7, 2009, OPR issued its draft CEQA guidelines revisions pursuant to SB 97. On February 16, 2010, the Office of Administrative Law approved the Amendments and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

Office of Planning and Research Technical Advisory and Preliminary Draft CEQA Guidelines Amendments for Greenhouse Gas Emissions

Consistent with SB 97, on March 18, 2010, the CEQA Guidelines were amended to include references to GHG emissions. The amendments offer guidance regarding the steps lead agencies should take to address climate change in their CEQA documents.

According to OPR, lead agencies should determine whether greenhouse gases may be generated by a proposed project and, if so, quantify or estimate the GHG emissions by type and source. Second, the lead agency must assess whether those emissions are individually or cumulatively significant. When assessing whether a project's effects on climate change are cumulatively considerable, even though its greenhouse gas contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. Finally, if the lead agency determines that the greenhouse gas emissions from the proposed project are potentially significant, it must investigate and implement ways to avoid, reduce, or otherwise mitigate the impacts of those emissions.

The Amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The Preliminary Amendments maintain CEQA's discretion for lead agencies to establish thresholds of significance based on individual circumstances.

The guidelines developed by OPR provide the lead agency with discretion in determining what methodology is used in assessing the impacts of greenhouse gas emissions in the context of a particular project. This guidance is provided because the methodology for assessing greenhouse gas emissions is expected to evolve over time. The OPR guidance also states that the lead agency can rely on qualitative or other performance based standards for estimating the significance of greenhouse gas emissions.

California Air Resources Board: Interim Significance Thresholds

In October 2008, CARB released interim guidance on significance thresholds for industrial and residential projects (CARB 2008a). The draft proposal for industrial projects states that a project would not be significant if, with mitigation, it will emit no more than 7,000 metric tons CO_2e per year from non-transportation related sources and performance standards for construction and transportation emissions.

California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan as directed by AB 32 (CARB 2008b). The Scoping Plan proposes a set of actions designed to reduce overall greenhouse gas emissions in California. The measures in the Scoping Plan approved by the Board will be in place by 2012, with further implementation details and regulations to be developed, followed by the rulemaking process to meet the 2012 deadline. Measures include a cap-and-trade system, car standards, low carbon fuel standards, landfill gas control methods, energy efficiency, green buildings, renewable electricity standards, and refrigerant management programs.

California businesses are required to report their annual greenhouse gas emissions. The report is within Sections 95100 through 95133 of Title 17, California Code of Regulations. It establishes who must report GHG emissions to CARB and sets forth the requirements for measuring, calculating, reporting, and verifying those emissions. The rule specifies a reporting threshold of 25,000 metric tonnes of CO_2.

California Air Resources Board and SB 375

SB 375 (by Senator Daniel Steinberg) became effective January 1, 2009. This new law requires CARB to develop regional reduction targets for GHG and prompts the creation of regional plans to reduce emissions from vehicle use throughout the state. California's 18 Metropolitan Planning Organizations (MPO) are required to develop Sustainable Community Strategies through integrated land use and transportation planning and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035.

The Southern California Association of Governments, the MPO for the Los Angeles area, released target development recommendations to the CARB in October 2009 that recommended setting 2005 as the base year and using a per capita reduction metric, such as tons per person or household. CARB will develop specific reductions.

California Climate Action Registry General Reporting Protocol

The California Climate Action Registry, a voluntary greenhouse gas registry, is a program of the Climate Action Reserve. The California Climate Action Registry was created in 2001 when a group of chief executive officers, who were investing in energy efficiency projects that reduced their organizations' greenhouse gas emissions, asked the State to create a place to accurately report their greenhouse gas emissions history. The California Climate Action Registry publishes a General Reporting Protocol, which provides the principles, approach, methodology, and procedures to estimate GHG emissions.

Local

Permits – Regulations II and III

SCAQMD Regulations II and III contain a series of rules specifying requirements and permit fees to construct and operate stationary equipment capable of emitting air contaminants, including air pollutant emission control equipment. Regulation II sets the general requirements for obtaining SCAQMD permits. Rules 201 through 203 require Permits to Construct and Permits to Operate. Rule 219 provides for exemptions from permit requirements under Regulation II. The exemptions of particular significance to the proposed Project include Rule 219(a), Mobile Equipment; Rule 219 (b), Combustion and Heat Transfer Equipment; Rule 219(d), Structures and Equipment (general); Rule 219(e), General Utility Equipment; and Rule 219(n), Storage and Transfer Equipment.

Prohibitions – Regulation IV

Emission prohibitions (Regulation IV) define the allowable concentration and emission levels for pollutants from specific sources and activities, as well as inspection and maintenance requirements for sources of emissions. For example, Rule 402, Nuisance, prohibits discharge of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or that endanger the comfort, repose, health, or safety of any such persons or the public; or that cause, or have a natural tendency to cause, injury or damage to business or property.

Rule 403, Fugitive Dust, prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area that remain visible beyond the emission source property line. Best available control measures identified in the rule would be required to minimize fugitive dust emissions from unpaved areas. For landside project construction staging areas, measures such as site watering and vehicle speed control on unpaved surfaces may be required.

<u>Source Specific Standards – Regulation XI</u>

The Project is also subject to individual source-specific rules under SCAQMD Regulation XI. This regulation contains a series of rules governing emissions from specific sources including Rule 1142, Marine Tank Vessel Operations; Rule 1173, Control of VOC Leaks and Releases from Components at Petroleum Facilities and Chemical Plants; and Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities. To comply with Rule 1142, Chevron has elected to use permitted auxiliary barges fitted with vapor recovery equipment to capture gasoline vapors rather than constructing a permanent onshore vapor recovery system.

New Source Review – Regulation XIII

Regulation XIII sets forth requirements to obtain permits to construct and permits to operate for new emission sources or modification of existing sources.

Toxics and Other Non-Criteria Pollutants – Regulation XIV

Regulation XIV specifies emission standards and emission control requirements for emissions of toxic and other non-criteria pollutants from specified sources.

Local Climate Change Regulations

The SCAQMD has adopted guidance concerning CEQA evaluation of greenhouse gas emissions associated with residential and commercial projects. A SCAQMD board meeting on December 5, 2008, adopted an interim threshold of 10,000 tonnes CO_2 for stationary and industrial facilities. Residential development thresholds have not been adopted as of this writing.

4.4.3 Significance Criteria

Criteria for determining the significance of air quality impacts are based on Federal, state, and local air pollution standards and regulations. Impacts on air quality are considered to be significant if the proposed Project's emissions would:

- Increase ambient air pollution levels from below to above these standards;
- Contribute measurably to an existing or projected air quality violation; or
- Be inconsistent with measures contained in the applicable Air Quality Management/Attainment Plan.

Potential significant air quality impacts in the Basin are evaluated using SCAQMD criteria for measurable emissions, Project-related emission factors, and daily threshold levels from the Project's operation. These criteria are presented in Table 4.4-8.

Table 4.4-8
SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	**Construction, lb/day (kg/day)**	**Operation, lb/day (kg/day)**
NO_x	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_x	150	150
CO	550	550
Lead	3	3
Toxic Air Contaminants and Odor Thresholds		
TAC (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Hazard Index ≥ 1.0 (Project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality for Criteria Pollutants		
NO_2 1-hour average annual average	District is in attainment; Project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state) 0.03 ppm (federal)	
PM_{10} 24-hour average annual	10.4 $\mu g/m^3$ (construction) and 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$	
$PM_{2.5}$ 24-hour average	10.4 $\mu g/m^3$ (construction) and 2.5 $\mu g/m^3$ (operation)	
Sulfate 24-hour average	1 $\mu g/m^3$	
CO 1-hour average 8-hour average	District is in attainment; Project is significant if it causes or contributes to an exceedance of the following attainment standards: 20 ppm (state) 9.0 ppm (state/federal)	
Greenhouse Gas Emissions[1]		
CO_2, N_20, CH_4, etc	If the Project's GHG emissions are less than or mitigated to less than 10,000 metric tonnes CO_2 equivalent per year the Project is presumed to be insignificant for GHGs	

[1] The adopted Interim GHG significance threshold is applicable only to industrial (stationary source) projects

Notes: lb/day = pounds per day,kg/day = kilograms per day, ppm = parts per million, $\mu g/m^3$ = micrograms per cubic meter

Source: SCAQMD 2009

4.4.4 Impact Analysis and Mitigation Measures

Methodology

Air quality impacts are presented for the continuation of current operations and for the changes that may occur over the proposed 30-year lease period. These changes most likely would include routine repair and maintenance activities that may be necessary during the lease period, the potential for pipeline replacement, and the potential for increased vessel calls at the Marine Terminal.

Based on Chevron's application presented in Section 2.0, Project Description, it is estimated that throughput at the Marine Terminal could increase by an estimated one percent per year from present levels through the lease term.

The impacts of the proposed Project on local and regional air quality are dependent upon emission increases or decreases attributable to the Project. An emissions analysis for operations at the Project site is presented below. As air quality significance is based on peak day for criteria pollutants, the emission sources and forecast criteria emissions from the proposed future site's worst-case daily operations are compared to the emissions from the site's current worst-case day operations.

For toxic emissions, the annual increase in emissions would impact the estimated cancer and chronic risk levels.

For GHG emissions, the annual increase in activities would increase GHG emissions.

The net changes in future emissions are compared to the thresholds (see Table 4.4-8) to determine their significance. Air quality impacts are also analyzed for the various alternatives identified.

Future Construction Emissions

Routine repair and maintenance activities may be necessary during the lease period. Such activities may include rearranging the seafloor pipelines, replacing sections of the pipelines to allow for smartpig passage and replacing pipelines, pipeline end manifolds, and associated hoses. In addition, minor improvements to the mooring and onshore facilities, equipment testing, and spill and safety drills may occur throughout the lease term as needed.

If pipeline replacement is necessary during the new 30-year lease term, it would require more effort than routine repair and maintenance activities; therefore, the worst-case day for construction-related air emissions would occur during pipeline replacement. Construction and replacement of pipelines for a single berth is expected to take one to two months, with three construction phases: (1) pipeline construction and assembly at Port of Los Angeles (POLA) or Port of Long Beach (POLB); (2) pipeline transportation to the Marine Terminal; and (3) offshore installation.

Phase 1, Assembly of Pipeline String, would require assembly of the pipeline string at the POLA or POLB, where the pipeline segments would be assembled, inspected, and launched for towing to the offshore construction site. Construction equipment required during this phase would include: two welders operating six hours per day, one dozer operating four hours per day, two sidebooms operating five hours per day, and two mobile cranes operating five hours per day. Three transport trucks would transport equipment and supplies daily to and from the POLA/POLB site. The trucks would travel approximately 50 miles (80.5 km) per day. It is estimated that 15 construction workers would be traveling approximately 50 miles (80.5 km) per day for each construction phase.

Following Phase 1 activities, the pipelines would be launched in Phase 2, Pipeline Launching. Three operating tugs--two for towing the pipeline and one assisting—would launch the pipelines. A speed boat, or similar vessel, would accompany the tow to ensure that pleasure craft do not interfere with the towing.

During Phase 3, Offshore Pipeline Installation, a derrick barge towed by one tug will install the pipeline offshore. Construction equipment, including a welding machine and a crane, would operate for eight hours per day.

Table 4.4-9 shows peak daily construction emissions. The table shows that Phase 2, Pipeline Launching, would generate the highest daily emissions, primarily because of the three tugboats operating simultaneously.

Table 4.4-9 also compares the Project's estimated construction emissions to the SCAQMD significance threshold levels. There would be no exceedances for any pollutant. Therefore, no significant adverse air quality emissions would result from Project construction during the proposed lease term (Class III).

Table 4.4-9
Maximum Daily Construction Emissions Associated with Potential Pipeline Replacement

Construction Activity	CO, lb/day (kg/day)	VOC, lb/day (kg/day)	NO_x, lb/day (kg/day)	SO_x, lb/day (kg/day)	PM_{10}, lb/day (kg/day)	$PM_{2.5}$, lb/day (kg/day)
Phase 1 - Assembly of Pipeline String						
Marine Vessels	--	--	--	--	--	--
Construction Equipment	13.5 (6.1)	3.7 (1.7)	22.0 (10.0)	3.2 (1.5)	2.0 (0.9)	1.8 (0.8)
On-Road Vehicles	10.4 (4.7)	1.2 (0.5)	6.4 (2.9)	0.0 (0)	1.1 (0.5)	0.3 (0.1)
Total - Phase 1	23.9 (10.8)	4.9 (2.2)	28.4 (12.9)	3.2 (1.5)	3.1 (1.4)	2.1 (1.0)
Phase 2 - Pipeline Launching						
Marine Vessels	516.7 (234.4)	11.8 (5.4)	80.6 (36.6)	19.3 (8.8)	57.5 (26.1)	52.9 (24.0)
Construction Equipment	--	--	--	--	--	--
On-Road Vehicles	9.6 (4.4)	1.0 (0.5)	1.0 (0.5)	0.0 (0)	0.8 (0.4)	0.2 (0.1)
Total - Phase 2	526.3 (238.7)	12.8 (5.8)	81.6 (37.0)	19.3 (8.8)	58.3 (26.4)	53.0 (24.0)
Phase 3 - Offshore Pipeline Installation						
Marine Vessels	142.1 (64.5)	3.1 (1.4)	25.4 (11.5)	6.4 (2.9)	19.1 (8.6)	17.6 (8.0)
Construction Equipment	6.2 (2.8)	1.7 (0.8)	9.5 (4.3)	1.3 (0.6)	0.7 (0.3)	0.7 (0.3)
On-Road Vehicles	9.6 (4.4)	1.0 (0.5)	1.0 (0.5)	0.0 (0)	0.8 (0.4)	0.2 (0.1)
Total - Phase 3	157.9 (71.6)	5.8 (2.6)	35.9 (16.3)	7.8 (3.5)	20.7 (9.4)	18.4 (8.3)
Maximum Daily Emissions	526.3 (238.7)	12.8 (5.8)	81.6 (37.0)	19.3 (8.8)	58.3 (26.4)	53.0 (24.0)
Significance Threshold	550 (24.95)	75 (5.8)	100 (45.4)	150 (68.0)	150 (68.0)	55 (24.9)
Exceeds Threshold?	No	No	No	No	No	No

Note: The following best management practices for construction activities were assumed as part of the Project: All construction equipment shall be properly maintained and the engines tuned to the engine manufacturer's specifications and the construction equipment engine size shall be the minimum practical size to support the required scope of work.

Localized Construction Air Quality Impacts

The SCAQMD staff developed localized significance thresholds (LST) methodology (SCAQMD 2009) and mass rate look-up tables by source receptor area (SRA) that can be used to determine whether or not a project may generate significant adverse localized air pollutant concentrations. The LST represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable Federal or state ambient air quality standard and are developed based on the ambient concentrations of that pollutant for each source receptor area.

The LST are derived using one of three methodologies depending upon the attainment status of the pollutant. For attainment pollutants NO_2 and CO, the mass rate LST are derived using an air quality dispersion model to back-calculate the emissions per day that would cause or contribute to a violation of any CAAQS for a particular source receptor area. The most stringent standard for NO_2 is the one-hour state standard; and for CO it is the one-hour and eight-hour state standards.

The LST were developed based upon the size or total area of the emissions source, the ambient air quality in each SRA where the emission source is located, and the distance to the sensitive receptor. The LST for NO_2 and CO are derived by adding the incremental emission impacts from the Project activity to the peak background NO_2 and CO concentrations and comparing the total concentration to the most stringent ambient air quality standards. Background criteria pollutant concentrations are represented by the highest measured pollutant concentration in the last three years at the air quality monitoring station nearest to the proposed Project site.

Construction PM_{10} and $PM_{2.5}$ LSTs are developed using a dispersion model to back-calculate the emissions necessary to exceed a set concentration. The set concentration for developing PM_{10} LSTs is 10.4 $\mu g/m^3$ 24-hour average for construction and 2.5 $\mu g/m^3$ 24-hour average for operations.

Peak daily on-site emissions associated with Phase 1, Assembly of Pipeline String, were compared with the LST to evaluate the potential for localized CO, NO_2, PM_{10}, or $PM_{2.5}$ impacts. Because neither the precise location nor the size of the Phase 1 construction site has been determined, the most conservative assumptions were used in the LST lookup tables (one-acre site, 82-foot [25-meter] receptor distance). Phases 2 and 3 were not evaluated for localized impacts because these activities would take place offshore, away from receptors, thereby minimizing the potential for a significant localized impact.

Maximum daily Phase 1 emissions and the LST are summarized in Table 4.4-10. The table shows the Project would not exceed any LST. Therefore, localized Project construction during the proposed lease term would not cause any significant adverse air quality concentrations (Class III).

Table 4.4-10
Summary of Localized Construction Air Quality Impacts Analysis (Unmitigated)

Phase 1	CO, lb/day (kg/day)	NO_x, lb/day (kg/day)	PM_{10}, lb/day (kg/day)	$PM_{2.5}$, lb/day (kg/day)
Maximum Daily On-Site Emissions	13.5 (6.1)	22.0 (10.0)	2.0 (0.9)	1.8 (0.8)
Localized Significance Threshold	674 (305.7)	91 (41.3)	5 (2.3)	3 (1.4)
Threshold Exceeded?	**No**	**No**	**No**	**No**

Notes: Ten percent of automobile and transport truck emissions are assumed to occur on the construction site. All off-road construction equipment emissions are assumed to occur on-site. Because neither the location nor the size of the Phase 1 construction site has been determined, the most conservative assumptions were used in the LST lookup tables (one acre site, 82-foot [25 meter] receptor distance).
Source: SCAQMD Localized Significance Thresholds 2009

Operational Criteria Emissions

With a new 30-year lease, the Marine Terminal would continue its current operations, retain Berths 3 and 4 in their current configuration, and maintain its onshore facilities. In addition, no change in the number of employees at the Marine Terminal is anticipated. Although the proposed Project may increase the annual number of ship calls and associated emissions from marine tankers calling at the Marine Terminal, peak daily emissions would not increase. There would be no change in the worst-case daily operational scenarios outlined in Table 4.4-4 and accordingly, no change in the worst-case daily operational emissions presented in Table 4.4-5.

Because there would not be an increase in the peak day emissions, as there would be the same activities on the peak day in the future scenario as in the current scenario, no new significant criteria pollutant emission impacts would occur from future activities (Class III).

In practice, unmitigated peak daily hoteling emissions from tankers may actually decrease in the future because of the new CARB regulation requiring cleaner fuels in auxiliary engines. However, this regulation was not accounted for in the emission calculations because, under certain conditions, fees can be paid in lieu of using cleaner fuels.

Operational Odors

Some individuals may sense that emissions from the combustion of diesel fuel have an objectionable odor, although it is difficult to quantify the odorous impacts of these emissions to the public. The mobile nature of the Project vessel emission sources would help to disperse the emissions and the distance between Project emission sources at the berths and the nearest residents should be enough to allow for adequate dispersion of these emissions to less than significant odor levels.

Because most of the emissions associated with the Marine Terminal are located offshore, at or beyond Berths 3 and 4, continued Project operations are not anticipated to generate significant odor impacts in adjacent communities. The Chevron Products Company El Segundo Refinery Heavy Crude Project Final EIR (SCAQMD 2006) (Heavy Crude Project) conducted a dispersion modeling analysis of hydrogen sulfide (H_2S) from the Refinery. Sulfur compounds, such as H_2S, are the most noticeable odor source in Refinery operations. The maximum one-hour average off-site H_2S concentration from air dispersion modeling was predicted to be 2.76 µg/m3, which is equivalent to 0.0020 ppm. This concentration is approximately 25 percent of the H_2S odor threshold concentration of 0.0081 ppm (SCAQMD 2006). As the Refinery is located in closer proximity to populations than the Marine Terminal berths, continued operation of the Marine Terminal would not generate significant odor impacts (Class III).

Localized Operational Air Quality Impacts

Because the peak daily or peak hour emissions associated with the proposed Project would not change relative to existing conditions, the Project would have no impact on maximum onshore ambient 24-hour concentrations of PM_{10}, $PM_{2.5}$, and sulfates; eight-hour concentrations of CO; or one-hour concentrations of NO_2 and CO.

The maximum onshore annual NO_2 concentration is estimated based on ISC modeling for annual impacts associated with hoteling of the vessels in the year 2040. Modeling indicates that the impacts of NO_2, assuming complete conversion of the NOx emissions to NO_2 due to the distance from the berths to onshore areas, would be less than one part per billion (0.001 ppm). This would be less than significant for annual localized NO_2 impacts. See Appendix E for more information on modeling results.

Air Quality Plan Consistency

Consistency with the AQMP is defined as being consistent with the goals, objectives, and assumptions of the plan (SCAQMD 2007). The AQMP contains an emissions inventory baseline that is a basis for forecasting emissions. This forecast emissions inventory, in turn, provides a basis for the emissions reduction effort necessary to meet clean air standards. Emissions from this facility and other oil facilities have been included in the emissions inventory baseline and forecast data.

The emissions inventory forecast includes, in part, a forecast of emissions attributable to oil production, transportation, refining, and marketing in the SCAB. This forecast involves market projections and assumptions about the role of hydrocarbon fuels in the future, but does not include the emissions reduction effects of AQMP measures. Future trends in petroleum use provide a basis for these forecasts. The actual total amount of hydrocarbon use in the SCAB would be a function of balancing market demand and air quality goals.

The Marine Terminal facility would comply with all SCAQMD rules based on AQMP emissions control measures. In addition, the facility already operates in compliance with a current SCAQMD air permit. Therefore, the proposed Project is consistent with the AQMP (Class III).

Toxic Emissions

The proposed Project could increase emissions of toxic pollutants, primarily diesel particulates, due to the potential increase in vessel calls at the Marine Terminal. This would be considered a significant impact.

Impact AQ–1: Exceedance of Incremental Health Risk Threshold During Project Operations

Operational diesel particulate matter emissions from additional marine tankers could exceed the SCAQMD significance threshold for incremental cancer or chronic risk (Significant, Class I).

<u>Impact Discussion</u>

Recent studies have shown that for projects involving ocean-going vessels, the toxic air contaminant of primary concern is DPM and the health effects scenario of primary concern is individual lifetime cancer risk (CARB 2006, POLA 2008b). Because cancer risk estimates are based on long-term exposure periods of up to 70 years for residential receptors, a project's long-term emissions, rather than peak daily emissions, are used to calculate cancer risk. A project's long-term emissions are also used to calculate chronic hazard indices.

By contrast, the acute hazard index is based on peak one-hour emissions. Because peak short-term emissions would not change, operation of the project would not impact the acute hazard index.

Although maximum daily or hourly emissions would not increase at the Marine Terminal, annual emissions may increase, as additional tankers would deliver the additional crude oil and partially refined product and carry away additional product.

The maximum annual average onshore DPM concentration from hoteling emissions was estimated by the Heavy Crude Project EIR for an increase in tanker operations and modeled in this analysis. Scaling this concentration to the additional tankers per year expected in 2040 yields an onshore maximum cancer risk of 51.6 using the Heavy Crude Project modeling results, which would be a significant impact under the SCAQMD threshold criteria (greater than 10 cancer cases per million or a health hazard index of 1.0, see Table 4.4-8).

To determine the non-cancer, acute health impacts associated with the proposed Project, the final year of the lease was analyzed. Scaling from the Heavy Crude Project EIR yields a maximum incremental acute hazard index of 0.03, which is below the SCAQMD significance threshold of 1.0 (SCAQMD 2006). This would be a less than significant impact.

<u>Mitigation Measure</u>

AQ-1. **Low Sulfur Fuels in Marine Main and Auxiliary Engines.** Starting at the beginning of the new 30-year lease period and continuing throughout the 30-year lease period, all main and auxiliary engines on crude oil marine tankers calling at the Marine Terminal shall use marine diesel oil or marine gas oil with a maximum of 0.2 percent sulfur by weight. This measure shall apply while the tankers are within 20 nautical miles (37.0. kilometers) of Point Fermin, including while hoteling or transferring product at the Marine Terminal.

<u>Rationale for Mitigation</u>

MM AQ-1 would reduce DPM emissions from marine tanker auxiliary engines during transit, hoteling, and product transfer at the Marine Terminal. This measure would apply to all tankers calling at the Marine Terminal, not just the potential additional tankers associated with the proposed Project. San Pedro Bay Ports Clean Air Action Plan measures OGV-3 and OGV-4 specify using lower sulfur fuel; the measures require using lower sulfur distillate fuels in the auxiliary engines of ocean going vessels within 20 nm (37.0 km) of Point Fermin and while at berth (POLA and POLB 2006).

Recent regulations (CARB Ocean-Going Vessel Auxiliary Diesel Engine Regulation Title 13 CCR 2299.1 and Title 17 CCR 93118) required ship auxiliary engines operating in California waters to use MDO with a maximum of 0.5 percent sulfur by weight or use marine gas oil, effective January 1, 2007. Then, starting on January 1, 2010, auxiliary engines operating in California waters must meet a second set of emission limits.

The use of 0.2 percent sulfur fuel, as opposed to 0.1 percent sulfur fuel, is primarily due to the limited supply of 0.1 percent sulfur fuel (POLA 2008b). Other EIR, including the recent Pier 400 EIR, prescribe the use of 0.2 percent sulfur fuel as mitigation measure due to the lack of availability of 0.1 percent sulfur fuel (POLA 2008b).

<u>Residual Impacts</u>

Auxiliary engines using MDO with a sulfur content of 0.2 percent would reduce their NOx emissions by 10 percent (over 2.5 percent fuel oil), DPM emissions by 64 percent, and SOx emissions by 93 percent (SBPB 2006). A reduction in DPM emissions of 64 percent would reduce cancer risk to 18.6 cases per million, which would still be considered a significant impact (greater than 10 cancer cases per million or a health hazard index of 1.0, see Table 4.4-8).

Greenhouse Gas Emissions

Impact AQ–2: Emissions of GHG within the SCAB Could Exceed SCAQMD Thresholds.

Operational GHG emissions from additional marine tankers could exceed SCAQMD significance thresholds (Significant, Class I).

<u>Impact Discussion</u>

The emissions of GHG could increase with the proposed project as the number of vessel calls could increase. The GHG emissions associated with the year 2040 operations are shown in Table 4.4-11.

Table 4.4-11
Proposed Project Greenhouse Gases Emissions Summary

Emission Source	Annual Emissions (tons/year)		
	N_2O	CO_2	CH_4
Within SCAB			
Vessel movements – engines & boilers	2.9	45,008	1.0
Tug assistance	0.08	8,066	1.1
MT fugitive emissions (loading & offloading, components, tanks)	0.0	17.4	34.7
MT indirect (electrical & offsite)	0.001	3,307	0.003
Totals	3.0	56,398	36.8
Future Total, CO_2 equivalent , metric tonnes	52,284		
Current Total, CO_2 equivalent , metric tonnes	37,317		
Increase	14,967		
Within California			
Vessel movements – engines & boilers	4.2	72,174	1.5
Tug assistance	0.08	8,066	1.1
MT fugitive emissions (loading & offloading, components, tanks)	0.0	17	34.7
MT indirect (electrical & offsite)	0.001	3,307	0.003
Totals	4.3	83,564	37.4
Future Total, CO_2 equivalent , metric tonnes	77,122		
Current Total, CO_2 equivalent, metric tonnes	55,014		
Increase	22,107		
Outside of SCAB and California - Worldwide			
Vessel movements - engines & boilers	72.3	1,459,750	27.7
Future Total, CO_2 equivalent, metric tonnes	1,334,471		
Current Total, CO_2 equivalent, metric tonnes	950,845		
Increase	383,626		

Notes: MT = Marine Terminal
Electrical generation assumes CALISO weighted average GHG emission rate. California emissions include emissions within SCAB plus emissions from barges.

Emissions of GHG associated with the proposed Project increase in vessel calls would be more than the SCAQMD threshold of 10,000 metric tons per year equivalent, as defined by the SCAQMD for stationary sources. Although the Marine Terminal is not a stationary source and would therefore not be subject to the GHG threshold requirements, the SCAQMD threshold for a stationary source has been applied. The GHG emissions from future Marine Terminal operations within the SCAB would be more than the SCAQMD threshold and would therefore be potentially significant.

Mitigation measures have been developed for GHG emissions in other reports, such as the Pier 400 EIR or the Port Climate Action Plan (POLA 2007). These plans identify mitigations, such as using shore-side electric power while hoteling. Many of these are not applicable to an offshore marine terminal and would not be applicable to the Marine Terminal operations.

Approximately 34 percent of the GHG emissions occur from vessels while hoteling, 44 percent occur while vessel is in transit while in the SCAB and the remaining occurs due to tugs and shore-side electrical use for pumps and equipment.

<u>Mitigation Measure</u>

AQ-2. **Greenhouse Gas Reduction Strategies.** The Applicant shall implement a program to quantify and reduce greenhouse gas emissions associated with Marine Terminal operations, such as using green electrical power to run onshore equipment, requiring tugs to use biodiesel, using marine diesel oil fuels in vessel main and auxiliary engines while in the SCAB, and reducing vessel speed while in the SCAB, within one year of lease renewal and submit reports to CSLC annually thereafter.

<u>Rationale for Mitigation</u>

Several measures could be implemented to reduce GHG emissions, including using green power, requiring tugs to utilize biodiesel or other alternate fuels, using MDO fuel, and reducing the speed of vessels while within the SCAB. Both the use of green power and the use of biodiesel in tugs would reduce GHG emissions since renewable energy sources and biodiesel emit fewer, if any, lifecycle GHG emissions. The use of MDO fuel could reduce GHG emissions by two percent due to the slightly lower carbon content of MDO compared to residual fuel oil (IMO 2009). The reduction of vessel speeds produces fewer emissions on a per mile basis due to the power law relationship between vessel speed and fuel use (Psaraftis 2009).

<u>Residual Impacts</u>

A combination of these measures could reduce the GHG emissions to below the 10,000–tons-per-year SCAQMD threshold for stationary sources. However, the ability to implement some of these measures is uncertain; therefore the impacts would still be potentially significant (Class I)

Table 4.4-12
Summary of Air Quality Impacts and Mitigation Measures
Proposed Project

Impact	Mitigation Measures
AQ-1: Exceedance of Incremental Health Risk Threshold During Project Operation	**AQ-1.** Low Sulfur Fuels in Marine Main and Auxiliary Engines
AQ-2: Emissions of Greenhouse Gases within the SCAB Could Exceed SCAQMD Thresholds	**AQ-2**. Greenhouse Gas Reduction Strategies

4.4.5 Impacts of Alternatives

No Project Alternative

Operations

The reduction in operational air emissions from closing the Marine Terminal would be a beneficial impact of the No Project Alternative, and air quality may improve in the vicinity of the Marine Terminal in the short term. However, other means of transporting crude oil and product would need to be developed, including truck, rail, pipeline and vessels loading and unloading in the POLA/POLB. The exact levels of these activities are too speculative to estimate. However, if all of the required crude oil and product transfers move through the POLA/POLB, then emissions would most likely decrease over the current operations as the POLA/POLB has better emission control technologies and requirements than the Marine Terminal currently does (POLA and POLB 2006). These include the use of alternative marine power on some vessels (increasing in the future), shore-side pumps, slide valves and reduce sulfur fuel.

However, these reductions could be offset if crude oil is moved by truck and rail, which would increase emissions on a per barrel basis over marine tanker operations.

Thus, in the long term, there would most likely be no net benefit to regional air quality (Class III impact).

Construction

Construction activities related to the abandonment of the Marine Terminal onshore and offshore facilities would be greater than the proposed project as there would be more activity. The thresholds most likely would be exceeded and this would be considered a significant impact.

Impact AQ–3: Exceedance of Air Quality Standards During Construction

Construction emissions from abandoning the Marine Terminal upon lease termination would likely exceed SCAQMD significance thresholds (Potentially Significant, Class I).

Preparing the Project site for future use (i.e., removing all Marine Terminal equipment) could involve a substantial amount of on-site construction equipment and soil excavation. Based on a recent study of construction at a marine terminal, emissions related to preparing the Project site for future use would probably exceed SCAQMD significance thresholds for NOx, PM_{10}, and $PM_{2.5}$ (POLA 2008). This would be a temporary but significant impact (Class I).

Construction emissions would be generated primarily from: (1) on-site exhaust emissions (CO, VOC, NOx, PM_{10}, and $PM_{2.5}$) from construction equipment; (2) on-site fugitive PM_{10} and $PM_{2.5}$ emissions from excavation and earth disturbance; (3) fugitive road dust (PM_{10} and $PM_{2.5}$) emissions from vehicle travel on paved or unpaved roads on site; (4) off-site exhaust emissions (CO, VOC, NOx, PM_{10}, and $PM_{2.5}$) from truck traffic and worker commute trips; and (5) off-site road dust (PM_{10} and $PM_{2.5}$) associated with traffic to and from the off-site parking facility and the facility.

Table 4.4-13
Summary of New Air Quality Impacts and Mitigation Measures
No Project Alternative

Impact	Mitigation Measures
AQ-3: Exceedance of Air Quality Standards During Construction	None

CBM Relocation in State Waters for Crude Only

This alternative would involve relocating the Berth 4 conventional buoy mooring (CBM) and navigational moorings to deeper waters approximately two to three miles (3.22 to 4.83 km) offshore.

Construction

Although the construction would likely have a longer duration than the construction associated with the proposed project, the peak day construction emissions would be similar to the proposed Project pipeline replacement since a similar amount of peak day activity would be necessary to install the additional pipelines and the new berth equipment as would be necessary to install new pipelines as part of the potential future maintenance associated with the proposed Project. Therefore, peak day construction emissions associated with this alternative would be similar to the proposed Project and less than significant.

Operations

Operation of this alternative may require additional shore-side pumps, which would likely be electrical like the current pumps.

Odor emissions would be similar to the current operations with a somewhat reduced possibility of odors since Berth 4 would be farther offshore. Localized and toxic emissions impacts would also be reduced since Berth 4 would be farther from shore, thereby reducing the concentration of pollutants onshore.

GHG emissions would be reduced within the SCAB and California under this alternative since there would be fewer vessel calls at the Marine Terminal. The GHG emissions compared to emissions associated with current operations within the SCAB would increase but would still be less than the SCAQMD threshold for stationary sources. However, worldwide GHG emissions would be the similar to the proposed project (see Appendix E).

Although fewer vessels would be calling at the berths due to the ability of very large crude carriers (VLCC) to call at the relocated CBM, air quality significance for criteria emissions is based on the peak day. Peak daily operational emissions could increase over the current operations as larger vessels equipped with larger main propulsion engines would call at the relocated berth. However since the auxiliary engines would be similar in size to the vessels that currently call at the Marine Terminal, hoteling emissions would be similar. Table 4.4-14 shows emissions associated with the simultaneous use of a VLCC vessel and a product vessel (the same scenario as the proposed Project, see Table 4.4-4) assuming that the VLCC vessel utilizes the southern approach route for transit as a worst case.

As the emissions would increase over current operations, above the significance thresholds, this would be considered a significant impact.

Table 4.4-14
Criteria Air Emissions Peak Day
Alternative Operations

Source	CO, lb/day (kg/day)	VOC, lb/day (kg/day)	NO_x, lb/day (kg/day)	SO_x, lb/day (kg/day)	PM_{10}, lb/day (kg/day)	$PM_{2.5}$, lb/day (kg/day)
Marine Vessel Activities						
Tanker Transit and Maneuvering	210 (95.3)	2 (0.9)	2,676 (1213.8)	1,665 (755.2)	229 (103.8)	211 (95.7)
Hoteling/Product Transfer Engine Combustion	88 (39.9)	27 (12.2)	746 (338.4)	929 (421.4)	76 (34.5)	70 (31.8)
Product Transfer Vapor Emissions	0 (0)	2,728 (1237.4)	0 (0)	0 (0)	0 (0)	0 (0)
Tug Boat Assistance	71 (32.2)	2 (0.9)	13 (5.9)	3 (1.4)	10 (4.5)	9 (4.1)
Total Marine Vessel Emissions	369 (167.4)	2,759 (1251.5)	3,435 (1558.1)	2,597 (1178.0)	315 (142.9)	290 (131.5)
Stationary Sources						
Tank Emissions	0 (0)	249 (112.9)	0 (0)	0 (0)	0 (0)	0 (0)
Mobile Sources						
Employee Vehicle Trips	6.3 (2.9)	0.7 (0.3)	0.7 (0.3)	0.004 (0.002)	0.5 (0.2)	0.1 (0.0)
Total Emissions	**375 (171.1)**	**3,009 (1364.9)**	**3,436 (1558.5)**	**2,596 (1177.5)**	**315 (142.9)**	**290 (131.5)**
Change from Proposed Project	+35 (15.9)	0 (0)	+441 (200.0)	+261 (118.4)	+37 (16.8)	+34 (15.4)
Significance Threshold	550 (249.5)	55 (24.9)	55 (24.9)	150 (68.0)	150 (68.0)	55 (24.9)

Impact AQ–4: Criteria Emissions Associated With Vessel Operations Would Exceed SCAQMD Thresholds.

Operational NOx and SOx emissions associated with vessel transit and maneuvering would exceed the SCAQMD significance threshold for criteria emissions (Significant, Class I).

Impact Discussion

The use of larger vessels with larger main engines associated with the berth located farther offshore would increase the emissions of criteria pollutants within the SCAB. This increase would exceed the SCAQMD thresholds for NOx and SOx.

Mitigation Measure and Rationale for Mitigation

MM AQ-1 would reduce NOx and SOx emissions from marine tanker engines during transit, maneuvering and hoteling, and product transfer at the Marine Terminal. This would reduce SOx emissions to below the thresholds, but would not reduce NOx emissions a sufficient amount to be below the thresholds. Therefore, this would remain a significant impact.

Table 4.4-15
Summary of New Air Quality Impacts and Mitigation Measures
CBM Relocation in State Water for Crude Only

Impact	Mitigation Measures
AQ-4: Criteria Emissions Associated With Vessel Operations Would Exceed SCAQMD Thresholds	**AQ-1.** Low Sulfur Fuels in Marine Main and Auxiliary Engines.

SPM Replacement in State Waters for Crude Only

Under this alternative, the Marine Terminal would continue to operate, but one of the existing Berth 4 CBM would be decommissioned and a new single point mooring (SPM) would be established farther offshore in state waters.

Construction

Peak day emissions during installation of the SPM would be similar to the level of emissions from construction implemented with the CBM alternative or the pipeline replacement associated with the proposed Project.

Operations

Operation of this alternative might require additional shore-side pumps. It is likely that electrical pumps would be used since the current pumps are electrical.

Although fewer vessels would call at the berths because VLCC and ultra large crude carrier (ULCC) vessels will call at the relocated CBM, air quality significance for criteria emissions is based on the peak day, as in the CBM relocation alternative above. Peak daily operational emissions would increase over emissions under current operations as larger vessels would call at the relocated berths, which are equipped with larger main propulsion engines. Since the auxiliary engines would be similar in size to those on vessels that currently call at the Marine Terminal, hoteling emissions would be similar. Table 4.4-14 shows emissions associated with the simultaneous use of a VLCC vessel along with a smaller product vessel. Impacts would be significant as per **AQ-4**. Mitigation measure **MM AQ-1** would apply; however, impacts would remain significant (Class I).

Odor, localized and toxic emissions would be similar to the CBM replacement alternative discussed above with a reduction in all of these impacts due to a portion of the activities being located farther offshore, which would reduce onshore impacts.

A reduction in GHG emissions would be associated with this alternative similar to the reduction associated with the CBM relocation alternative (see Appendix E).

VLCC Use of Pier 400

The Pier 400 VLCC light crude alternative would direct all light crude oil currently lightered from VLCC tankers farther offshore and unloaded at the Marine Terminal, to the proposed Pier 400 facility in the POLA. The crude oil would be unloaded in the POLA and transported to the Chevron El Segundo Refinery. Modifications were made to the existing pipeline system to allow the crude oil to be transported to the Refinery.

Construction

Construction would still be required as per the proposed Project as the existing berths would still be used under this alternative. Therefore, peak day emissions would be the same as those under the proposed Project.

Operations

Operation of this alternative would still have a similar peak day emissions scenario as the proposed Project as vessels would continue to call at the Marine Terminal and have transit, maneuvering and hoteling emissions at the Marine Terminal.

Odor and localized impacts would be similar to the proposed Project. Toxic emissions would be reduced due to the reduction in the number of vessels calling at the Marine

Terminal. There would be an increase in toxic emissions at the Pier 400 facility due to the increase in vessels calling at Pier 400. However, emissions at the Pier 400 would most likely decrease over emissions at the Marine Terminal as the POLA/POLB would be equipped with better emission control technologies and requirements than the Marine Terminal currently does (POLA and POLB 2006). These include the use of alternative marine power on some vessels (increasing in the future), shore-side pumps, slide valves and reduce sulfur fuel.

There would be a reduction in GHG emissions in the SCAB associated with this alternative as there would be fewer vessels calling at the Marine Terminal and the Pier 400 (due to the elimination of Marine Terminal-related lightering).

4.4.6 Cumulative Projects Impact Analysis

Section 3, Alternatives and Cumulative Projects, considered other projects in order to evaluate cumulative air quality impacts. The proposed Project is one of a number of projects that would contribute to cumulative air quality impacts as a result of facility expansions or modifications.

For instance, Chevron has proposed to modify equipment at the Refinery to increase the Refinery's capability to process heavy crude oil and to increase coker capacity. Chevron anticipates that importing heavier crude oil may increase the number of smaller marine tankers calling at the Terminal and decrease the number of larger marine tankers. This change would cause a net increase of nine crude oil marine tanker deliveries per year, which has been accounted for in Section 2.0, Project Description. The Heavy Crude Project EIR determined that project would generate significant emissions of CO, VOC, NOx, and PM_{10} during construction but no significant air quality impacts during operation (SCAQMD 2006).

Chevron is currently proposing to modify the crude oil storage tanks, the No. 4 Crude Unit, and the Coker at the Refinery, adjacent to the Marine Terminal, to increase the capacity to process heavy crude oil. Since the construction activities for the proposed modifications at the Refinery are anticipated to be completed in the near term, prior to the beginning of possible pipeline replacement at the Terminal, emissions from Refinery construction activities would not overlap with emissions from Terminal pipeline replacement activities.

Construction emissions from the proposed Project would not exceed SCAQMD significance thresholds, and, therefore, would not be significant independently.

However, when the proposed Project's construction emissions are combined with the potential air emissions from other construction projects in the area, the resultant emissions may be significant for some air contaminants cumulatively within the Project region. For localized emissions impacts, any concurrent emissions-generating activity in the vicinity of the Project site would contribute additional air emissions. None of the cumulative projects discussed in Section 3.0, Alternatives and Cumulative Projects, are close enough to the location of Project construction to generate cumulative localized impacts.

During the peak day of operation, emissions from the Marine Terminal would not increase under the proposed Project. Although other projects in the vicinity may have significant impacts associated with air pollutant emissions, the Project would not contribute to any increased significance.

The potential increase in vessel calls at the Marine Terminal would increase cancer risks and NO_2 ambient levels at receptors that may also be exposed to other cumulative project DPM emissions. Therefore, although elevated health risks due to increased emissions are not significant under the Project, the cumulative impacts could be significant.

Increases in vessel calls at the POLA/POLB associated with other projects (e.g., the Pier 400 Project) would increase emissions in the area, which, combined with increased vessel calls at the Marine Terminal under the proposed Project, could increase impacts and would then be considered cumulatively significant. The Pier 400 EIR indicates that the project may cause a decrease in vessel calls due to the use of larger tankers (POLA 2008).

Operation of the proposed Project would increase air pollutants due to the combustion of diesel fuel. Some individuals may sense an objectionable odor from diesel fuel combustion emissions, although it is difficult to quantify the odorous impacts of these emissions to the public. While the mobile nature of vessel emission sources would help disperse emissions and the distance between Project emission sources and the nearest residents should be far enough away to allow adequate dispersion of these emissions to less than significant odor levels from a project-specific level, these odors would combine with odors from other future projects. As a result, when combined with other projects, the proposed Project would potentially produce objectionable odors.

Project GHG emissions would contribute to GHG emissions from other projects, and therefore, would contribute to the causes of global climate change. In combination with projects in the POLA/POLB and elsewhere in California, the emissions would exceed SCAQMD thresholds and are therefore cumulatively significant.